

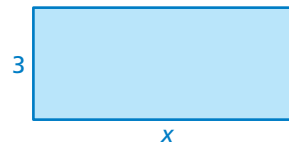
9.3 Input-Output Tables

Essential Question How can you use a table to describe a function?

1 ACTIVITY: Using a Function Table

Work with a partner.

- a. Copy and complete the table for the perimeter of the rectangle.



Input, x	1	2	3	4	5
Output, P					

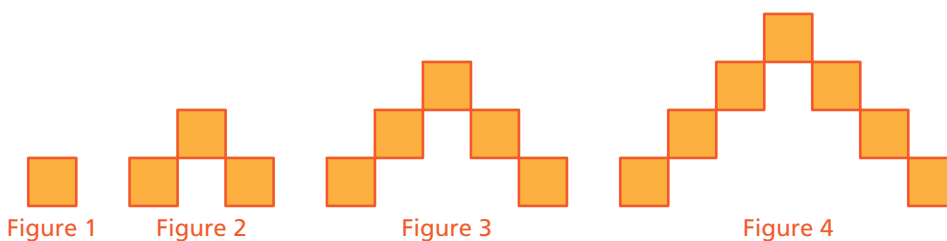
- b. Write an equation that describes the function.
 c. Use your equation to find the value of x for which the perimeter is 50.

2 ACTIVITY: Using a Function Table

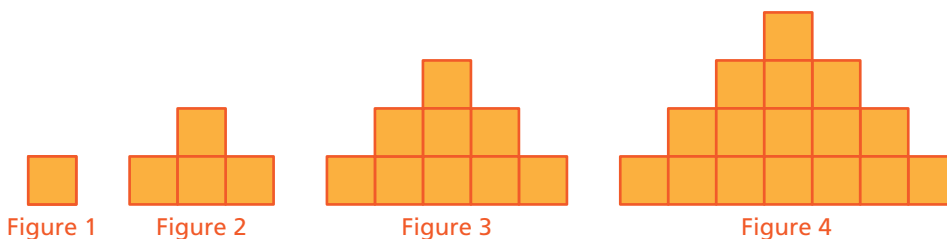
Work with a partner. Use the strategy shown in Activity 1 to make a table that shows the pattern for the area. Write an equation that describes the function. Then use your equation to find which figure has an area of 81.



- a.



- b.



3 ACTIVITY: Making a Function Table

Work with a partner. Copy and complete a sales tax table for each of the four cities.

Madison, WI, 5.50%

Sale, x	\$20	\$30	\$40	\$50	\$60
Sales Tax, T					

Ann Arbor, MI, 6.00%

Sale, x	\$20	\$30	\$40	\$50	\$60
Sales Tax, T					

Edison, NJ, 7.00%

Sale, x	\$20	\$30	\$40	\$50	\$60
Sales Tax, T					

Norman, OK, 7.50%

Sale, x	\$20	\$30	\$40	\$50	\$60
Sales Tax, T					

What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you use a table to describe a function? Describe an example of a function table in real life.

Amount of Sale	Tax
.10 - .16	.01
.17 - .33	.02
.34 - .50	.03
.51 - .66	.04
.67 - .83	.05
.84 - 1.09	.06



"Dear Sir: Yesterday, I bought a piece of 9-cent candy six times and paid NO tax. Today, I bought six pieces at once and you charged me \$0.04 tax. What's going on?"

Practice

Use what you learned about input-output tables to complete Exercises 3 and 4 on page 382.

Key Vocabulary

input-output table,
p. 380

Key Idea

Input-Output Tables

A function can be represented by an **input-output table**. The table below is for the function $y = x + 2$.

Input, x	Output, y
1	3
2	4
3	5
4	6

$\leftarrow y = x + 2$
 $\leftarrow 3 = 1 + 2$
 $\leftarrow 4 = 2 + 2$
 $\leftarrow 5 = 3 + 2$
 $\leftarrow 6 = 4 + 2$

EXAMPLE 1 Completing Input-Output Tables

Write an equation for the function. Then copy and complete the table.

- a. The output is 1 less than the input.

Input, x	2	3	4	5
Output, y				

- b. The output is twice the input.

Input, x	0	3	6	9
Output, y				

- a. An equation is $y = x - 1$.

Input, x	2	3	4	5
Output, y	1	2	3	4

$y = x - 1$

- b. An equation is $y = 2x$.

Input, x	0	3	6	9
Output, y	0	6	12	18

$y = 2x$

On Your Own

Write an equation for the function. Then copy and complete the table.

- The output is 5 more than the input.
- The output is the product of 7 and the input.

Input, x	1	3	5	7
Output, y				

Input, x	0	2	4	6
Output, y				

Now You're Ready
Exercises 5 and 6

EXAMPLE 2 Standardized Test Practice

Which function rule is shown by the table?

- (A) $y = 5x$ (B) $y = \frac{x}{5}$
 (C) $y = x + 4$ (D) $y = 10x$

Input, x	Output, y
1	5
2	10
4	20
8	40

Look at the relationship between the inputs and outputs. Each output y is 5 times the input x . So, the function rule is $y = 5x$.

∴ The correct answer is (A).

EXAMPLE 3 Finding a Missing Input

Input, x	Output, y
1	7
5	15
10	25
20	45
?	53

Each output in the table is 5 more than twice the input. Find the missing input.

Step 1: Write an equation for the function shown by the table.

Words Output is five more than twice the input.

Variables Let y be the output value and x be the input value.

Equation $y = 5 + 2 \cdot x$

An equation is $y = 5 + 2x$.

Step 2: Substitute 53 for y . Then solve for x .

$$y = 5 + 2x \quad \text{Write the equation.}$$

$$53 = 5 + 2x \quad \text{Substitute 53 for } y.$$

$$48 = 2x \quad \text{Subtract 5 from each side.}$$

$$24 = x \quad \text{Divide each side by 2.}$$

Check

$$2x + 5 = 53$$

$$2(24) + 5 \stackrel{?}{=} 53$$

$$48 + 5 \stackrel{?}{=} 53$$

$$53 = 53 \quad \checkmark$$

∴ The missing input is 24.

On Your Own

Use the first three input values to write an equation for the function shown by the table. Then find the missing input.

3.

Input, x	Output, y
1	5
3	7
7	11
?	25

4.

Input, x	Output, y
2	1
4	2
6	3
?	4

Now You're Ready
Exercises 7–13

Vocabulary and Concept Check

- VOCABULARY** Explain how you can use an input-output table to represent a function.
- DIFFERENT WORDS, SAME QUESTION** Which is different? Find “both” answers.

What output is 4 more than twice the input 3?

What output is twice the sum of the input 3 and 4?

What output is the sum of 2 times the input 3 and 4?

What output is 4 increased by twice the input 3?

Practice and Problem Solving

Copy and complete the input-output table for the function.

3. $y = x + 5$

Input, x	1	2	3	4
Output, y				

4. $y = 4x$

Input, x	0	2	4	6
Output, y				

Write an equation for the function. Then copy and complete the table.

- 1 5. The output is 3 more than the input.

Input, x	0	1	2	3
Output, y				

6. The output is 5 times the input.

Input, x	1	3	5	7
Output, y				

Write an equation for the function shown by the table.

2 7.

Input, x	1	2	3	4
Output, y	9	10	11	12

8.

Input, x	2	4	6	8
Output, y	4	8	12	16

9.

Input, x	0	3	6	9
Output, y	0	1	2	3

10.

Input, x	3	5	7	9
Output, y	1	3	5	7

11. **ERROR ANALYSIS** Describe and correct the error in writing an equation for the function shown by the table.



Input, x	0	4	8	12
Output, y	0	1	2	3

$y = 4x$

In Exercises 12 and 13, copy and complete the table.

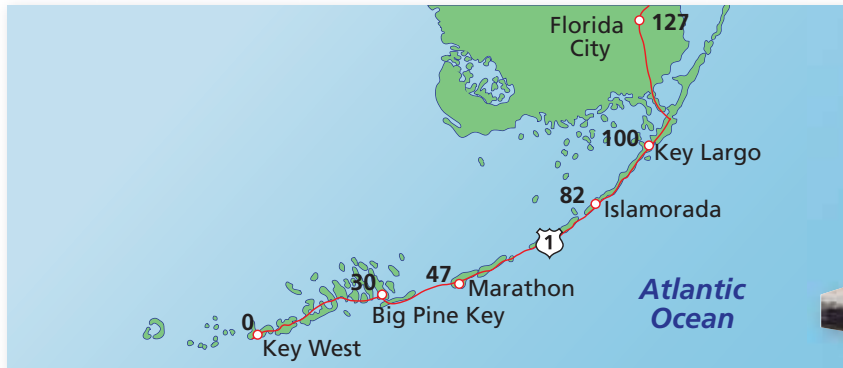
- 3 12. For each output, multiply the input by 4, then subtract 5.

Input, x	2	3	4	7		
Output, y	3	7	11	23	35	55

13. For each output, divide the input by 2, then add 4.

Input, x		2	4	10		
Output, y	4	5	6	9	12	17

14. **GEOGRAPHY** You travel along US Highway 1 from mile marker 0 in Key West to mile marker 100 in Key Largo.



- a. Copy and complete the input-output table.

Distance from Key West, x	0	30	47	82	100
Distance to Key Largo, y					

- b. Write a function rule in which x is the input and y is the output.
 c. Can you use your function rule to find the distance to Florida City? If not, write a function rule that you can use.
15. **TIME** Make an input-output table with the Greenwich Mean Time (GMT) hourly times as inputs, and times where you live as outputs. Write a function rule for the data.
16. **Critical Thinking** Write an equation with the same outputs as $y = 2x + 3$ for $x = 0, 1, 2, 3,$ and 4 .



Fair Game Review what you learned in previous grades & lessons

Plot the ordered pairs in the same coordinate plane. (*Skills Review Handbook*)

17. (1, 2) 18. (0, 7) 19. (2, 3) 20. (6, 5)

21. **MULTIPLE CHOICE** Which is the solution of the inequality $6x \leq 24$? (*Section 8.3*)

- (A) $x < 4$ (B) $x \leq 4$ (C) $x < 144$ (D) $x \leq 144$